

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : SUMITOMO METAL MINING CO LTD

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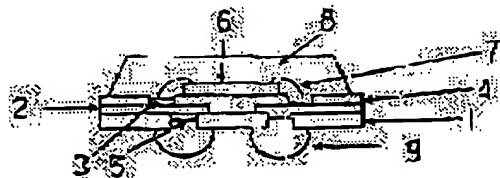
(72)Inventor : MITSUNARI NAOHITO

### (54) CARRIER TAPE WITH REINFORCING SECTION AND SEMICONDUCTOR DEVICE USING THE SAME

#### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a carrier tape which can prevent the occurrence of troubles when tape BGAs(ball grid arrays) manufactured in a reel-to-reel system and carried on the tape are handled due to the warping of the substrates of the BGAs after the BGAs are separated into individual BGAs, and can make the BGAs to be easily handled when the BGAs are carried or assembled in various kinds of electronic equipment in an assembling process.

**SOLUTION:** A picture frame-like reinforcing section is formed of one metallic tape of a carrier tape consisting of an insulating film and at least two or more metallic layers, and a wiring section 2 is formed of the other metallic layer. The metallic layers and an insulating layer 1 are constituted without using any adhesive material in such a way that the insulating layer 1 is provided in at least the wiring section 2 of the outermost wiring layer except electrode pad portions 3, and a via hole 5 is provided inside the frame-like reinforcing section from the insulating film side, and then, constituting the reinforcing section to have the same strength as a lead frame has.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] It is a carrier tape using insulating films, such as a TAB tape used in order to manufacture Tape BGA, Tape CSP, etc., as a base material. The frame-like reinforcement section is formed from one metal layer of an insulating film and the tape which consists of metal layers more than two-layer at least. The wiring section is formed from other metal layers, and the beer hall punctured from the insulating film side is established in the inside field of the frame-like reinforcement section. The carrier tape with the reinforcement section characterized by being constituted without having the thickness in which the frame-like reinforcement section has about the same reinforcement as a leadframe, and a metal layer and an insulating layer minding a binder.

[Claim 2] Carrier tapes according to

claim 1 other than the electrode pad part of the wiring layer of the outermost layer on which the insulating layer was prepared in the wiring section at least.

[Claim 3] The carrier tape according to claim 1 or 2 whose metal layer ingredient is copper and whose thickness of the reinforcement section is 15-100 micrometers.

[Claim 4] The long picture-like carrier tape film with which the carrier tape indicated by either of claims 1-3 was constituted continuously.

[Claim 5] The semiconductor device constituted using the carrier tape indicated by either of claims 1-3.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]**

[0001]

[Field of the Invention] This invention relates to the carrier tape for semiconductor devices.

[0002]

[Description of the Prior Art] Recently, high density and a miniaturization are demanded also for the IC package with the high density and miniaturization of the electronic equipment represented by the personal computer etc. It corresponds to this and is the former. It can respond to many-items child-ization further rather than the IC package of the peripheral type represented by Quad Flat Package (QFP). The IC package area array type [,

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such as Ball Grid Array (BGA) and Chip Size Package (CSP), I has been offered. [0003] Although current and BGA have plastics BGA in use which used the printed circuit board for the base material, its Tape BGA and Tape CSP which used the flexible patchboard made from a resin film, for example, a TAB tape, for the base material are increasing. This is that inner lead bonding of a \*\* pitch is possible to connection with a semiconductor chip on such Tape BGA and Tape CSP, and a reel. Tow It is because there are the advantages, like that manufacture with a reel method is possible and the reduction in a manufacturing cost is possible.

[0004] For example, drawing 1 is the sectional view of the tape BGA created using the TAB tape. The wiring section 2 is formed using the conductive layer prepared in the front face of an insulating layer 1, and the 2nd insulating layer 4 is formed so that it may be covered except electrode pad section 3 of this wiring section. And a beer hall 5 is established in the rear face of an insulating layer 1, and a semiconductor chip 6 is carried in the abbreviation center section of the TAB tape on which plating was performed to said electrode pad section 3 and beer hall section 5. Wirebonding of the electrode pad on a semiconductor chip and the electrode pad 3 of the wiring section 2 is carried out, they close a semiconductor chip 6 and a bonding wire

7 using closure resin 8, and the solder ball 9 is formed in a beer hall.

[0005] This TAB tape is produced using the resin tape which has the guide holes used when conveying a tape like each erector, such as a diamond touch, wirebonding, and a resin seal, to both ends, and has a conductive layer on that one side. Although the conductive layer of this resin tape is patternized, wiring is formed and a TAB tape is produced, specifically a resist is applied to a conductive layer front face, it is close, the mask of a desired pattern is exposed and etched according to a conventional method, and wiring is produced.

[0006] And in order to obtain Tape BGA using this TAB tape, on a TAB tape, the diamond touch of the semiconductor chip is carried out with a mounter, wirebonding is carried out and the electrode on the front face of a semiconductor chip and the end of wiring are connected. Then, the mold of a semiconductor chip and the wire part is carried out by resin, and a solder ball is prepared in the other end of wiring.

Usually, reel [ process / so far ] using a long tape Tow A reel method performs.

[0007] Then, BGA which continued on the tape is pierced to each BGA with metal mold, and is divided, and the tape BGA shown in drawing 1 is obtained.

[0008] In order to mount the tape BGA manufactured as mentioned above to the circuit board, flux is applied to the

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electrode top of the tape BGA mounting position established in the circuit board side, or the solder ball front face of Tape BGA, on this electrode, it touches, a reflow of the solder ball is carried out, and it connects with a solder ball, the electrode by the side of the circuit board, and a circuit pattern.

[0009] By the way, since such a tape BGA does not have rigidity in the tape itself which is an insulating layer when it divides into each tape BGA, if it remains as it is, handling actuation at the time of conveyance and attachment cannot be performed easily. For this reason, in order to hold and deal with it with a holder etc., it is necessary to stick them on the tape section, using a hard resin plate, a hard metal plate, etc. as the back up plate.

[0010]

[Problem(s) to be Solved by the Invention] It was made in order to solve the above-mentioned trouble, and this invention is a reel. A tow It makes it possible to prevent the curvature of the base material of the tape BGA which is the trouble of the letter of handling generated after dividing separately the tape BGA on the tape manufactured with the reel method, and aims at offering the carrier tape which can set like the erector to various electronic equipment, and can perform easily conveyance or handling actuation at the time of attaching.

[0011]

[Means for Solving the Problem] The carrier tape with the reinforcement section of invention of \*\*\*\* 1 which solves the above-mentioned technical problem It is a carrier tape using insulating films, such as a TAB tape used in order to manufacture Tape BGA, Tape CSP, etc., as a base material. If the frame-like reinforcement section is formed, the wiring section is formed from other metal layers and it requires from one metal layer of an insulating film and the tape which consists of metal layers more than two-layer at least Even if few [ other than the electrode pad part of the wiring layer of the outermost layer ], an insulating layer is prepared in the wiring section. Furthermore, a beer hall is established in the inside field of the frame-like reinforcement section from an insulating film side, and it has the thickness in which the frame-like reinforcement section has about the same reinforcement as a leadframe, is constituted, without a metal layer and an insulating layer minding a binder, and is a thing.

[0012] Moreover, invention of \*\*\*\* 2 is the long picture-like carrier tape film with which the carrier tape of invention of \*\*\*\* 1 was constituted continuously.

[0013] Furthermore, invention of \*\*\*\* 3 is the semiconductor device constituted using the carrier tape of this invention.

[0014]

[Embodiment of the Invention] The carrier tape with the reinforcement

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section of this invention consists of metal layers more than two-layer at least with the insulating film. And the frame-like reinforcement section consists of one metal layer, and the wiring section consists of other metal layers. Thus, since the semiconductor device assembled using the carrier tape with the reinforcement section of constituted this invention has rigidity, the handling at the time of carrying the semiconductor device concerned in various electronic equipment becomes very good.

[0015] In this invention, the magnitude of the frame-like reinforcement section, a configuration, etc. can be formed at usual photograph RISOGURAFU and a usual etching process that what is necessary is just to design suitably according to the magnitude of the semiconductor device to apply, a configuration, etc. Moreover, about thickness, it is selected according to the degree of hardness of the specifically used quality of the material that rigidity comparable as a leadframe should just be acquired. For example, what is necessary is just to use a copper plate with a thickness of 15 to 100 micrometers, when copper is used as the quality of the material.

[0016] In order to produce the carrier tape of this invention, the polyimide film with which the direct copper layer was prepared in the both sides is used. First, the guide holes for film transport which can be set like an erector are formed in

the both ends of this polyimide film by punching or chemical etching. It is a reel about this. Tow With a reel method, one copper layer is processed into frame-like reinforcement section structure using usual photograph RISOGURAFU and a usual etching process, and one side is processed into the wiring section.

[0017] Then, the carrier tape film of invention of \*\*\*\* 2 with which it punctured from the polyimide film side, the beer hall was prepared, it plated in the electrode pad section of the copper wiring section at the base of a beer hall and the wiring section, and the carrier tape of invention of \*\*\*\* 1 continued inside the frame-like reinforcement section is made. In addition, although whether an insulating layer is prepared in a wiring section front face changes with loading approaches of a semiconductor chip etc. and it cannot generally limit, the dependability of the semiconductor device which the direction in which the insulating layer was prepared all over the wiring side except the polar zone finished setting up becomes high.

[0018] Reel of the former [ mount / in this carrier tape film / a semi-conductor ] Tow A reel method can use as it is. And the tape BGA of the shape of a film finally acquired is separately divided using metal mold, and the semiconductor device of invention of \*\*\*\* 3 is completed.

[0019] In addition, a wiring layer, the

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frame-like reinforcement section, especially the frame-like reinforcement section are directly prepared in the direct insulating layer without an adhesives layer for preventing that adhesives become soft at the time of semiconductor device assembly, and location precision goes wrong by this invention.

[0020] Hereafter, a drawing explains this invention. Drawing 2 is the sectional view of the carrier tape with the reinforcement section of this invention. The wiring section 2 is formed using the conductive layer prepared in the front face of an insulating layer 1, the 2nd insulating layer 4 is formed so that it may be covered except electrode pad section 3 of this wiring section, and a beer hall 5 is established in the rear face of an insulating layer 1, and plating is performed to said electrode pad section 3 and beer hall section 5. And the reinforcement section 10 is formed in the periphery section of an insulating layer in the shape of a frame.

[0021] In addition, even if it uses the thing which the carrier tape film was cut [ thing ] in the strip-of-paper-like sheet configuration as deformation of this invention, and made the carrier tape of two or more this inventions hold in the sheet, it is needless to say that the desired end of this invention can be attained similarly, and it does not wait for a word that it is what constitutes a part of this invention.

[0022]

[Example] Next, this invention is further explained using an example.

[0023] along with the longitudinal direction of a copper polyimide substrate which, on the other hand, resembled one side of a long film-like polyimide film with a width of face [ of 48mm ], and a thickness of 75 micrometers, and prepared the copper layer with a thickness of 75 micrometers in it 18 micrometers in thickness, two or more [ spaced at 4.75mm ] guide holes were prepared.

[0024] Next, the resist layer was prepared all over the copper polyimide substrate, and it was close in the mask which has a circuit pattern on the resist layer front face by the side of a copper layer with a thickness of 18 micrometers, and close in the mask which has the pattern of the desired frame-like reinforcement section on the resist layer front face by the side of a copper layer with a thickness of 75 micrometers, and both sides were exposed and developed, the exposed copper layer was etched, respectively, and the wiring section with a thickness of 18 micrometers and the frame-like reinforcement section with a thickness of 75 micrometers were produced.

[0025] Next, the resist layer which remains was removed, the resist layer for polyimide etching was anew applied all over the copper polyimide substrate, that

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a beer hall should be formed in the location of the request by the side of the frame-like reinforcement section, it was close, the mask was exposed and developed, the polyimide film was etched, and the beer hall was formed.

[0026] Then, the resist layer which remains was removed, the insulating resist was again applied to the whole surface, the resist layer of the beer hall section and the resist layer of the electrode surface of the wiring section were removed, and silver plating was given to the beer hall section base and the electrode surface. Only the resist layer by the side of the reinforcement section was removed after that.

[0027] Thus, the long carrier tape film with which the carrier tape of this invention shown in drawing 2 continues was obtained. The semiconductor chip was mounted in the carrier tape like the semiconductor erector using this film, the resin seal was carried out including the wiring section, and the long film with which a solder ball is carried in a beer hall, and the semiconductor device of this invention continues was obtained. From this film, it divided for every piece using cutting metal mold, and the tape BGA with the reinforcement section which is the semiconductor device of this invention shown in drawing 3 was obtained.

[0028] Next, the mounter was used for the predetermined polar zone of a printed

wired board, respectively, and 500 semiconductor devices of obtained this invention were fixed to it, and a solder reflow was performed at 230 degrees C, and the solder ball was fused and it joined. then, the place which inspected each -- 500 any -- although -- it turned out that the good mounting condition that there is no opening resulting from the poor contact of a semiconductor device and that of the circuit pattern on the circuit board is acquired, without curvature occurring on a tape with the heat at the time of melting.

[0029] In addition, the resist ingredient which is not shown in this example, exposure conditions, development conditions, an etching reagent, etching conditions, etc. are not usually used, and were not specified especially.

[0030]

[Effect of the Invention] According to this invention, since a carrier tape with the reinforcement section is obtained in a series of actuation, it is not necessary to stick a stiffener etc. anew and the carrier tape which has sufficient reinforcement and smoothness simple is obtained. For this reason, in case the semiconductor device produced using the carrier tape of this invention is mounted in the circuit board, there is effectiveness of being able to prevent poor opening by heat beforehand.

[0031] Moreover, the carrier tape film of this invention is a long reel. Tow Since



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reel correspondence is attained, need to hold each carrier tape, it is not necessary to convey it with a holder etc., on the occasion of loading of a semiconductor chip, the same assembly as a leadframe can be performed, and there is an advantage that conventional assembly equipment can be used.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the sectional view of the tape BGA using the conventional carrier tape.

[Drawing 2] It is the sectional view of the carrier tape with the reinforcement section of this invention.

[Drawing 3] It is the sectional view of the tape BGA with the reinforcement section of this invention.

### [Description of Notations]

- 1 --- Insulating layer
- 2 --- Wiring section
- 3 --- Electrode pad section
- 4 --- The 2nd insulating layer
- 5 --- Beer hall
- 6 --- Semiconductor chip
- 7 --- Bonding wire
- 8 --- Closure resin
- 9 --- Solder ball
- 10 --- Frame-like reinforcement section

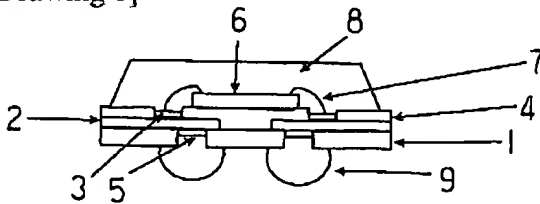
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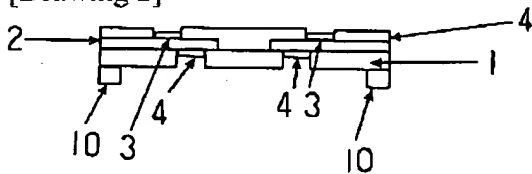
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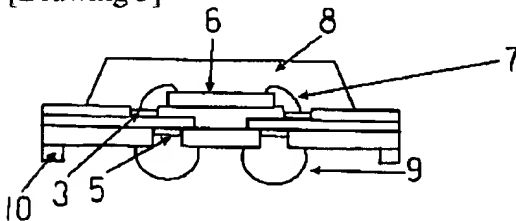
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]